

**UNITED STATES DISTRICT COURT FOR THE  
NORTHERN DISTRICT OF OKLAHOMA**

**B.H., a minor child, by and through her natural )  
parents and guardians, BILLIE AND JACKIE )  
HOLDER, et al., )**

**Plaintiffs, )**

**v. )**

**Case No. 04-CV-0564-CVE-PJC**

**GOLD FIELDS MINING CORPORATION, )  
et al., )**

**Defendants/Third Party Plaintiffs, )**

**v. )**

**UNITED STATES OF AMERICA, et al., )**

**Third-Party Defendants. )**

**OPINION AND ORDER**

Now before the Court is Defendants’ Motion to Exclude the Expert Testimony of David Sullivan (Dkt. # 377) and Defendants’ Motion in Limine to Exclude the Testimony and Expert Report of Plaintiffs’ Expert Paul B. Cravens (Dkt. # 378). On January 4, 2007, the Court held a hearing to assess the admissibility of expert testimony under Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), and most of defendants’ Daubert issues were resolved at that time. However, the Court took two issues under advisement. First, defendants claim that plaintiffs’ meteorology expert, David Sullivan (“Sullivan”), misapplied the Environmental Protection Agency’s (“EPA”) Wind Erosion Equation (“Equation”), and his expert opinions based

thereon should be excluded.<sup>1</sup> Second, defendants argue that plaintiffs' expert Paul B. Cravens, P.E. ("Cravens"), did not properly disclose his opinion that every defendant impacted every plaintiff through historical mining activities, and that Cravens lacks a reliable scientific basis for this opinion.<sup>2</sup>

## I.

Defendants argue that the proposed expert testimony of plaintiffs' meteorology expert, Sullivan, resulting from his application of the Equation is based on flawed methodology and should be excluded to prevent the jury from being exposed to unreliable scientific evidence.<sup>3</sup> Sullivan calculated the level of lead in the air and soil in specific locations in Picher, Oklahoma using a computer model called the Industrial Source Complex Model ("ISCST3"). When running the computer model, Sullivan was responsible for determining various mathematical values for entry into the ISCST3. According to defendants, when Sullivan applied the Equation he should have divided the climactic factor, "C", by 100 before entering the number into the Equation and, by failing to do so, Sullivan's results were 100 times higher than the correct result. Plaintiffs respond

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<sup>1</sup> Defendants' motion in limine to exclude the testimony of Sullivan was denied in all other respects. Dkt. # 742.

<sup>2</sup> Defendants Gold Fields Mining Corporation ("Gold Fields") and Blue Tee Corp. ("Blue Tee") adopted Defendant The Doe Run Resources Corporation's Motion in Limine to Exclude Certain Opinion Testimony by Plaintiffs' Expert Paul B. Cravens (Dkt. # 376) as part of their motion to exclude certain opinions of Cravens (Dkt. # 378). At the Daubert hearing, the Court stated it would address this issue at the pretrial conference. However, the Court has reviewed the briefing and finds that this motion (Dkt. # 376) primarily concerns the application of Fed. R. Civ. P. 26, not the reliability of Cravens' scientific opinions under Daubert. Therefore, additional oral argument will not be needed to resolve this issue.

<sup>3</sup> Defendants do not challenge Sullivan's qualifications to give expert testimony in this case. Sullivan is a certified consulting meteorologist with 32 years of experience. He has developed modeling systems used by the EPA and served as the principal investigator for the EPA's 6 Year Integrated Environmental Management Project.

that Sullivan could have used higher values for other factors in the equation, and his final results were reliable even if he misapplied the C factor.

Sullivan used the Equation to estimate the amount of dust blown from chat piles and tailings ponds each year. The Equation, as stated in Sullivan's report is as follows: Annual emission rates (tons/acre/year) =  $k a I K C L' V'$ . To calculate an annual emission rate, Sullivan assumed that "k", the total suspended particulates, equaled 1.0 and "a," the portion of total wind erosion losses assumed to be suspendable, equaled .025.<sup>4</sup> Sullivan assumed that there were 17 tons of chat piles per acre and 160 tons of tailings ponds per acre. Sullivan determined that "C," the climactic factor, was 8.5. Sullivan expressed the annual emission rate in terms of grams/meters squared/second, concluding that the annual lead emissions from chat piles were  $1.28 \times 10^{-7}$  g/m<sup>2</sup>/sec, and annual lead emissions from tailings ponds equaled  $1.21 \times 10^{-6}$  g/m<sup>2</sup>/sec.

Defendants take issue with Sullivan's decision to set "C" equal to 8.5 instead of .085. They claim that this inflates Sullivan's calculation of the annual emission rate by a factor of 100. The climactic factor incorporates local weather conditions, such as wind velocity, surface moisture, and evaporation rates. Sullivan referred to a map created by the EPA in 1988 to determine the climactic factor. Defendants submitted an expert report from Peter Drivas, Ph.D., who states that the climactic factor should always be stated as a decimal, because it acts as a reduction factor in the wind erosion equation. Defendants have also obtained reports from two other experts in air modeling, Gale

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<sup>4</sup> In this equation, "I" stands for the soil erodibility of the source in tons/acre/year, "K" is the surface roughness factor, "C" is the climactic factor, "L" is the unsheltered field width factor, and "V" is the vegetative cover factor. See Dkt. # 377, at 6. The following are the values used by Sullivan for each factor in the equation: k = 1.0; a = .025; I = 17 tons/acre/year for chat piles; I = 160 tons/acre/year for tailings ponds; K = 1.0; C = 8.5; L' = 1.0; and V' = 1.0.

Hoffnangle<sup>5</sup> and David Cabe, P.E.,<sup>6</sup> who conclude that Sullivan improperly applied the Equation when he failed to divide the C factor by 100.

The EPA prepared a report discussing the application the Equation entitled “Control of Open Fugitive Dust Sources” (“Report”). Dkt. # 377, Ex. 4. In regard to the C factor, the Report states:

Research has indicated that the rate of soil movement by wind varies directly as the cube of wind velocity and inversely as the square of soil surface moisture. Surface moisture is difficult to measure directly, but precipitation-evaporation indices can be used to approximate the amount of moisture in soil surface particles. Therefore, readily available climactic data can provide a quantitative indicator of relative wind erosion potential at any geographic location.

Id. at 9. The C factor can be calculated manually or by relying on a map in the Report.<sup>7</sup> The C factor was calibrated to a value of 1.0 based on the EPA’s research in Garden City, Kansas. The Report unequivocally states that C is a reduction factor to account for climates less conducive to wind erosion. Id. at 2. Sullivan testified that he used both methods to calculate this factor, and that he arrived at same result both ways. He acknowledges that the Report refers to C as a reduction factor, but he finds the Report contains ambiguities about when it is appropriate to input a decimal value for C.

At the Daubert hearing, Sullivan claimed that the climactic factor could be stated as a decimal or a whole number depending on the size of the region to which the Equation was applied. He believes that his application of the Equation was proper for determining windblown lead

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<sup>5</sup> Hoffnangle is a certified consulting meteorologist with 36 years of experience.

<sup>6</sup> Cabe is a professional engineer who was hired by defendants specifically to critique Sullivan’s expert report. See Dkt. # 377, Ex. 8, at 3.

<sup>7</sup> The report includes an equation to manually calculate the C factor:  $C = 0.345(W^3/(PE)^2)$ . The report also contains a map, figure 7-4, that plots approximate values for the C factor at various locations throughout the United States.

emissions on a local scale instead of a regional scale. Sullivan admits that this application of the Equation has not been discussed in any peer-reviewed literature, nor has he attempted to publish his theory. Sullivan compared his results to emission rates calculated by other experts for Tar Creek, and claims that he “felt confident that number [he] chose [was] appropriate.” Dkt. # 750, at 37. He claims that the emission rate he calculated is actually lower than the rate used by one of defendants’ experts, Cabe, and that even if the C factor was too high, his end results fall within an acceptable range.<sup>8</sup>

Plaintiffs’ primary argument is that Sullivan intentionally underestimated other factors in the Equation, and these reductions offset any increase caused by Sullivan’s failure to divide the climactic factor by 100. Even with a potential error in Sullivan’s formula, plaintiffs suggest that his conclusions are still consistent with the findings of other experts in the same field. Plaintiffs note four separate factors for which Sullivan could have used a higher value in his calculations: Sullivan could have used an “a” value of .38 instead of .025, which would have increased Sullivan’s result by a factor of 15; Sullivan could have substituted a value of 4 for the “K” factor and 4 for the “V” factor, instead of the 1.0 value he used for K and V in his calculations, which would have resulted in numbers 240 times higher; and Sullivan underestimated the lead concentration in the soil at .5% instead of 1%.

In Daubert, the Supreme Court held that district courts must initially assess the admissibility of expert testimony under Fed. R. Evid. 702. In Bitler v. A.O. Smith Corp., 400 F.3d 1227 (10th Cir. 2005), the Tenth Circuit discussed the role of district courts when considering a Daubert challenge.

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<sup>8</sup> Defendants assert that Cabe intentionally overestimated the wind emission rate to prove that defendant Asarco, Inc. did not significantly contribute to lead contamination in areas where plaintiffs could have been exposed.

First, the court should make a preliminary finding that the expert is qualified to testify. Next, the proponent of expert testimony must establish that the expert used reliable methods to reach his conclusion and that the expert's opinion is based on a reliable factual basis. The Tenth Circuit cited four factors that district courts should apply to make a reliability determination:

(1) whether a theory has been or can be tested or falsified; (2) whether the theory or technique has been subject to peer review and publication; (3) whether there are known or potential rates of error with regard to specific techniques; and (4) whether the theory or approach has "general acceptance."

Id. at 1233 (citing Daubert, 509 U.S. at 593-94). The Tenth Circuit was clear that "a trial court's focus generally should not be upon the precise conclusions reached by the expert, but on the methodology employed in reaching those conclusions." Id. In other cases, the Tenth Circuit has emphasized that any analytical gap in an expert's methodology can be a sufficient basis to exclude expert testimony under Daubert. Trucks Ins. Exchange v. MagneTek, Inc., 360 F.3d 1206, 1212-13 (10th Cir. 2004); Goebel v. Denver & Rio Grande Western R. Co., 346 F.3d 987, 992 (10th Cir. 2003). Under Daubert, "'any step that renders the analysis unreliable . . . renders the expert's testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology.'" Mitchell v. Gencorp Inc., 165 F.3d 778, 783 (10th Cir. 1999) (citing In re Paoli R.R. Yard PCB Litigation, 35 F.3d 717, 745 (3d Cir. 1994)).

Defendants justifiably dispute plaintiffs' attempt to create an after-the-fact justification that would bring Sullivan's results within the range plaintiffs desire. Cartwright v. Home Depot U.S.A., Inc., 936 F. Supp. 900 (M.D. Fla. 1996) (post hoc rationale for expert opinion suggests a lack of a reliable foundation under Daubert). Even if Sullivan reached a result with the range plaintiffs expected by using a whole number for the C factor of the Equation, this does not prove that Sullivan's methodology was reliable. Plaintiffs bear the burden to show that Sullivan's report

depicts a reliable application of the Equation, even if his results fall within an expected range. Although the Court found persuasive Sullivan's testimony at the Daubert hearing regarding his confidence in his results, there is simply no support in Sullivan's initial report or in peer-reviewed literature to justify his use of 8.5 for the C factor. See Norris v. Baxter Healthcare Corp., 397 F.3d 878, 886 (10th Cir. 2005) ("Plaintiff's and her experts efforts to discredit the epidemiology are not peer-reviewed, are not developed independent of litigation, and are not generally accepted by the relevant scientific community."). Sullivan claims that his specific application of the Equation was appropriate under the circumstances, even though he acknowledges that he deviated from the normal application of the C factor. However, the Court would not be fulfilling its duty as gatekeeper if it permitted the introduction of novel scientific methodology based solely on the assurances of the expert himself. Plaintiffs have not shown that Sullivan's use of the Equation in his report, using a C value of 8.5 instead of .085, was the result of reliable methodology. Without evidence that Sullivan's methodology has been peer-reviewed, validated outside of this litigation, or is generally accepted in the scientific community, the Court must exclude Sullivan's testimony to the extent it is based on his novel application of the Equation. Id.

#### *Effect of the Court's ruling*

Plaintiffs have effectively shown that the exclusion of Sullivan's calculation of the Equation requires only that the Court exclude portions of opinion number 2 in Sullivan's report. Sullivan's report is divided into three distinct sections. First, Sullivan reviews every possible source of lead contamination in Tar Creek, and concludes that lead from chat piles and tailings ponds is "the only source that could have produced the observed lead contamination of the surface soils in and around Picher, Oklahoma." Dkt. # 377, Ex. 3, at 53. Second, Sullivan conducted dispersion modeling

which relies, in part, on his application of the Equation. Finally, Sullivan compared modeled emission rates from several experts and compared it to observed lead contamination in Tar Creek. After reviewing Sullivan's report, the Court finds that opinion number 2 is the only portion of Sullivan's report that will be affected by the Court's ruling. Therefore, the Court will exclude opinion number 2 of Sullivan's report to the extent that it is based on his application of the Equation. At trial, plaintiffs are prohibited from offering any portion of the report or Sullivan's testimony based on his modeled emission rates using the Equation.<sup>9</sup>

## II.

Defendants claim that Cravens attempted to interject a new expert opinion during his deposition that was not disclosed in his report pursuant to Fed. R. Civ. P. 26(a)(2). During his deposition, Cravens opined that every defendant caused an injury to every plaintiff. However, this opinion is not explicitly disclosed in his Rule 26 report. Defendants also claim that Cravens lacks a reliable scientific basis to give this opinion at trial, because the conceptual model Cravens relied on for this opinion has never even been written down. Plaintiffs respond that this opinion was fairly disclosed in Cravens' report, and that Cravens conducted the necessary scientific research to support this statement.

Cravens is a professional engineer whose primary area of expertise is environmental engineering. He has served as a project manager for several Superfund sites and his experience includes "the analysis, investigation, evaluation, characterization and remediation of Superfund sites." Dkt. # 376, Ex. A., at 1. Plaintiffs hired Cravens to analyze the source of lead contamination

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<sup>9</sup> Although this Court typically does not admit expert reports into evidence (as opposed to the expert's testimony), if plaintiffs intend to offer Sullivan's report, they should prepare a redacted version of the report consistent with this Opinion and Order.



in Tar Creek, and Cravens submitted a Rule 26 report concluding that mining and milling waste was the primary cause of lead contamination. In his deposition, Cravens testified that he was “making a determination that every operation and every defendant impacted every plaintiff through their activities.” Dkt. # 376, Ex. B., at 58: 7-9. He stated that he developed a conceptual model that dust from one chat pile “leapfrogged” to other chat piles in a continuous cycle, so that it has become impossible to determine which defendant caused plaintiffs’ alleged injury. Cravens admitted that he did not specifically state this opinion in his report, but that this opinion could have been construed from his report when several opinions were considered together. However, Cravens could not cite any studies supporting his leapfrog idea and stated that the conceptual model existed only in his mind. Plaintiffs argue that Cravens impliedly disclosed his “leapfrog” theory that every defendant was responsible for exposing every plaintiff to lead contamination. They refer to opinions 1, 4, 9 and 13 in Cravens’ report in support of their argument that defendants were on notice of the leapfrog theory.<sup>10</sup>

The Federal Rules of Civil Procedure require an expert witness to prepare a report “containing a complete statement of all opinions to be expressed.” Fed. R. Civ. P. 26(a)(2)(B). A party’s failure to disclose the identity of an expert witness or provide an expert report requires the Court to automatically exclude expert testimony unless the violation of Rule 26(a)(2) was justified or was harmless under the circumstances. Fed. R. Civ. P. 37(c)(1); Woodworker’s Supply, Inc., v.

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<sup>10</sup> Opinions 1 and 13 have no discernable relation to the industry-wide causation theory offered by Cravens during his deposition. Opinion number 1 states that “[b]oth natural and anthropogenic soil levels are known for the Tar Creek study area and are greatly exceeded within this area.” Dkt. # 376, Ex. A, at 8. Opinion number 13 discusses the relationship between the lead levels of dust inside homes as opposed to the lead levels in soil. Neither of these opinions supports plaintiffs’ argument that Cravens properly disclosed his leapfrog theory in his expert report.

Principal Mutual Life Ins. Co., 170 F.3d 985, 992-93 (10th Cir. 1999). Under Rule 26(a)(2), courts may exclude specific opinions that were not fairly disclosed in the expert's report. Keach v. United States Trust Co., 419 F.3d 626, 641 (7th Cir. 2005). The Tenth Circuit has identified four factors to determine whether a violation of Rule 26(a)(2) was harmless or justified: (1) the prejudice or surprise to the party against whom the testimony is offered; (2) the ability of the party to cure the prejudice; (3) the extent to which introducing such testimony would disrupt the trial; and (4) the moving party's bad faith or willfulness. Woodworkers' Supply, Inc., 170 F.3d at 993.

Plaintiffs primarily rely on opinions number 4 and 9 in Cravens' report, but neither of these provides direct or indirect support for Cravens' broad conclusion that every defendant caused an injury to every plaintiff. In opinion number 4, Cravens states:

The distribution of lead in soils throughout the Tar Creek study area is widespread and pervasive with large contiguous areas having high levels (i.e. greater than 500 ppm) of lead. This is true to such an extent that, throughout much of the study area, residents are exposed to excessive lead-in-soil levels not only from their own properties but from adjacent properties and waste sites. Therefore, they were and are exposed when traveling through or adjacent to or performing activities at contaminated High Access Areas (HAA's), chat piles, dried tailings ponds, and other contaminated residences."

Dkt. # 376, Ex. A, at 10. Plaintiffs focus on the last sentence of this opinion and claims that it fairly depicts the idea that lead is dispersed throughout the community, and that all of defendants' sources are responsible for harming plaintiffs. Plaintiffs also cite opinion number 9, which plaintiff claims suggests the leapfrog idea:

A review of historical documents indicates that the distribution of dust from mining and milling operations (mine venting, rock/ore crushing, rock/ore handling and hauling) combined with windblown dust from chat piles, dried tailings ponds, and chat surfaced roads was a nuisance of which the responsible parties had been aware since at least the 1930's. Studies related to these dust problems, as well as anecdotal information in correspondence from that time, support the conclusion that dust from

mining/milling operations and wastes broadly and pervasively impacted the Tar Creek Study area.

Id. at 15. This statement simply supports Cravens' opinion that mining and milling waste in general is the primary cause of lead contamination, but it does not support an opinion that every defendant caused an injury to every plaintiff.

The leapfrog theory is a significant extension of Cravens' generic opinion that mining and milling waste caused plaintiffs' injury. The Court does not find any reference in Cravens' report to injuries caused by a specific defendant, other than generic references to contamination of Tar Creek by historical mining activities. Plaintiffs should have sought leave to supplement Cravens' report if he intended to offer a more specific opinion on causation. Fed. R. Civ. P. 26(e); Miller v. Pfizer, Inc., 356 F.3d 1326, 1332 (10th Cir. 2004); Jacobsen v. Deseret Book Co., 287 F.3d 936, 952 (10th Cir. 2002). Cravens simply opines that plaintiffs could be exposed to lead contamination at various places throughout the community because of the pervasive nature of lead contamination, but his report does not suggest that he intended to opine, or that he had evidence to prove, that every defendant injured every plaintiff. Plaintiffs have not argued that Cravens' omission was harmless or justified. Therefore, Cravens' leapfrog theory should automatically be excluded under Fed. R. Civ. P. 37(c)(1).

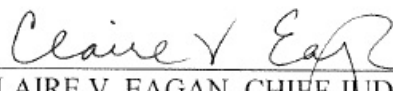
Even if Cravens had fairly disclosed this opinion, plaintiffs have not shown that Cravens has a reliable scientific basis to conclude that every defendant harmed every plaintiff. Plaintiffs claim that Cravens can support his causation opinion based on a conceptual model supported by his review of soil samples and EPA documents. However, Cravens admits that he has not reduced the conceptual model to paper, and it exists only in his mind. This is exactly the type of expert testimony that should be excluded under Daubert. When an expert offers opinion evidence based

on his experience, but without presenting testing, data, or other evidence of the scientific principles used to reach his opinion, the court should exclude expert testimony supported only by the “ipse dixit of the expert.” Pro Service Automotive L.L.C. v. Lenan Corp., 469 F.3d 1210, 1215 (8th Cir. 2006) (excluding causation opinion when expert did not conduct scientific testing or cite specific data supporting his opinion); Norris, 397 F.3d at 886 (“Although ‘[t]rained experts commonly extrapolate from existing data,’ neither Daubert nor the Federal Rules of Evidence ‘require a district court to admit opinion evidence which is connected to existing data only by the ipse dixit of the expert.’”). Without any scientific support for his conceptual model, the Court has no way to fulfill its gatekeeper function under Daubert.

At trial, Cravens may state his general opinion that mining and milling waste is the primary source of lead contamination in Tar Creek. However, the Court will not permit him to testify that every defendant caused an injury to every plaintiff based on his leapfrog theory.

**IT IS THEREFORE ORDERED** that Defendants’ Motion to Exclude the Expert Testimony of David Sullivan (Dkt. # 377) is **granted in part and denied in part**: the motion is granted as to Sullivan’s application of the Equation, but it is denied in all other respects. Defendants’ Motion in Limine to Exclude the Testimony and Expert Report of Plaintiffs’ Expert Paul B. Cravens (Dkt. # 378) is **granted in part and denied in part**: in addition to the Court’s rulings from the bench concerning this motion (Dkt. # 742), Cravens may not testify about his leapfrog theory of causation at trial.

**DATED** this 22nd day of January, 2007.

  
 CLAIRE V. EAGAN, CHIEF JUDGE  
 UNITED STATES DISTRICT COURT